R I D G E T O R E E F S / P R O T E C T O R E S D E C U E N C A S / N O A A R C

Guánica Hydroseeding 2013-2014

Paul Sturm, Ridge to Reefs

Roberto Viqueira and Louis Meyer, Protectores de Cuencas

RIDGE TO REEFS

PHONE 410.227.7689

paul@ridgetoreefs.org

Background

Ridge to Reefs and Protectores de Cuencas have defined a set of methods to stabilize bare soils on high mountain and dry coastal sites in Puerto Rico. These methods are applicable to other sites across the Caribbean and likely into the tropical areas of the Pacific. Our efforts began with NFWF funded hydroseeding/hydromulching efforts that included a Soil Stabilization Roundtable in Puerto Rico which involved technical partners/experts from US Fish and Wildlife Service, NC State University and Natural Resources Conservation Service (NRCS) and a PR Department of Agriculture extension agent from the high mountain areas of the Guanica watershed. Through the NFWF funded project we were able to test hydroseeding/mulching methods on slopes between 70 and 90% and refine suggested techniques. The Fiscal Y2012 (FY12) funds were used to expand and begin to implement these methods on a larger and broader scale and to diversify the types of sites which included two farm sites and one commercial site.

Summary

The goal of the project was to continue to implement stabilization efforts in the Guánica watershed on highly erodible soils. The project resulted in the stabilization of 6 acres. Highly Erodible Lands (HEL) were identified as a priority for implementation of the 2008 Guánica Watershed Management Plan. The work this year was focused on stabilizing three sites 1) Finca Santa Rita - a 3 acre site composed of a conveyance channel and a sediment basin, 2) Finca La Paz - a farm site composed of 2 acres of hydroseeding steep slopes in the Lajas Valley, 3) Hardware Store (ACE) Ferreteria Solar El Almacigo – where 1 acre of highly erodible bare soil was stabilized very close to a direct tributary of the Rio Loco in Yauco. Each of the sites resulted in very high levels of stabilization and vegetative cover.

The locations were identified as opportunities within priority subwatershed areas within the lower watershed (Figure 1). The Finca Santa Rita site was a priority site for NRCS for the construction of a large sediment pond which drains an urbanized area of Yauco and was eroding agricultural sediments into the Rio Loco. The 2nd site Finca La Paz site was identified as a recent clearing on steep slopes within the lower watershed in the foothills of the Lajas Valley. The 3rd site was a hardware store which was performing mass grading on a site adjacent to a road and impervious surfaces and a flow path leading directly to the Rio Loco. The Finca La Paz Site and the Hardware store site are larger sites and FY13 funds were used to complete the remaining acreage.

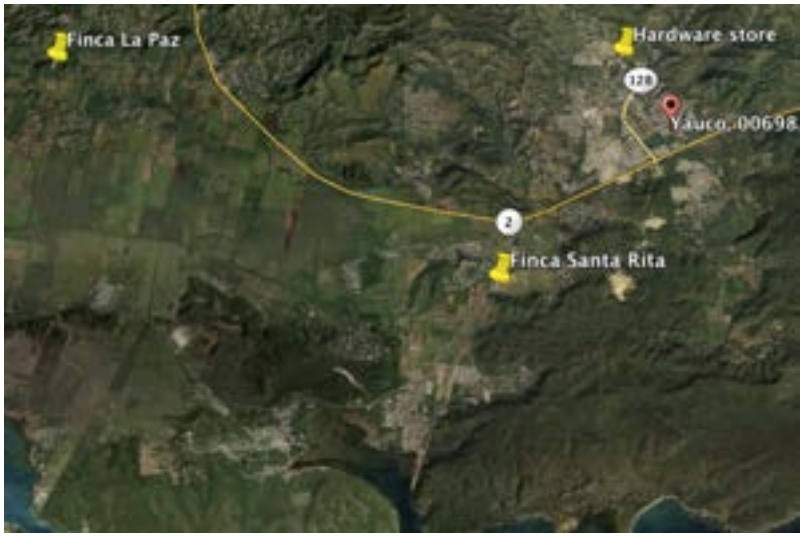

Figure 1. Project Location Map

Percent vegetative cover was restored to the sites at the respective rates >95%, 90% and >95%, the Finca La Paz farm site stabilization was diminished slightly due to the age of the site as it has been over 60 days since the site was cleared by the farmer –this resulted in lost soil, more sporadic growth at first and compacted soil making stabilization more challenging including lengthening the amount of time we needed to water than a freshly cleared site (Note: re-clearing the farm site would have increased cost and the risk of even more soil loss if a storm were to happen).

The project was able to gain significant match and support through the provision of water from the municipality of Guánica, labor and water provided by the hardware store. We estimate the value of this support to be equal to $7,500 from the municipality of Guánica for 15 truckloads of water as well as the labor and driver. Puerto Rico Department of Natural and Environmental Resources (DNER) also provided 10 truckloads of water and a driver at an estimated value of $5,000. The project also benefited from filling the water truck approximately 20 times for the hardware site equal to approximately $2,000.

Table 1. Project Implementation Summary

Component	Project 1	Project 2	Project 3	Total
Name	**Finca Santa Rita**	**Finca La Paz**	**Hardware Store (ACE) Ferreteria Solar El Almacigo**	**NA**
Landowner	Puerto Rico Land Authority	Private Farmer	Private Hardware Store	NA
Maintenance Agreement	Southwest Soil Conservation District	Private Farmer	With Hardware Store	NA
Permitting	Not needed	Not needed	Not needed	Not needed
Accomplishments /Metrics	3 acres of bare soil stabilized Restored to >95% vegetative cover	2 acres of bare soil stabilized Restored to >90% vegetative cover	1 acre of bare soil stabilized Restored to >95% vegetative cover	6 acres
Match*	$11,400.00**	$9,000.00*	$4,000.00*	$24,400.00
NOAA Funds	$16,300.00	$15,800.00	$7,900.00	$40,000.00
Total	$27,700.00	$24,800.00	$11,900.00	$64,400.00

*** Match Funds include supplies and materials from NFWF funding**
**** Includes $4,400 payment from the SW Soil Conservation District**

In summary, the achievements included:

- the stabilization of over 6 acres of bare soils - 4 acres at over 95% vegetative cover and 2 acres of over 90% vegetative cover
- over $24,400 in match from partners including labor and watering support and materials
- successful work in the agricultural community, urban community and business community
- maintenance and watering of the sites for over 1 month to ensure project success and 1 grass cutting after full establishment

Lessons Learned

- stabilization occurs best immediately after disturbance the longer the time between clearing and stabilization -- results in a less favorable substrate as often good soil for germination and growing can be washed away prior to hydroseeding efforts -- even considering that issue we were able to achieve >90% vegetative cover for Finca La Paz
- it is important for Protectores de Cuencas to establish a agreement with PRASA for water so that it can legally have access to water that it can take very rapidly such as thru a fire hydrant or other method
- signage is an important factor in urban and very visible locations to further educate the community
- two pumps allow us to cut our watering time in half and allow for extra watering
- increased the seed to 7 lbs rye and 6 lbs bermuda instead of 7 lbs rye and 3 lbs bermuda - results in better stabilization
- site prep and soil prep is critical

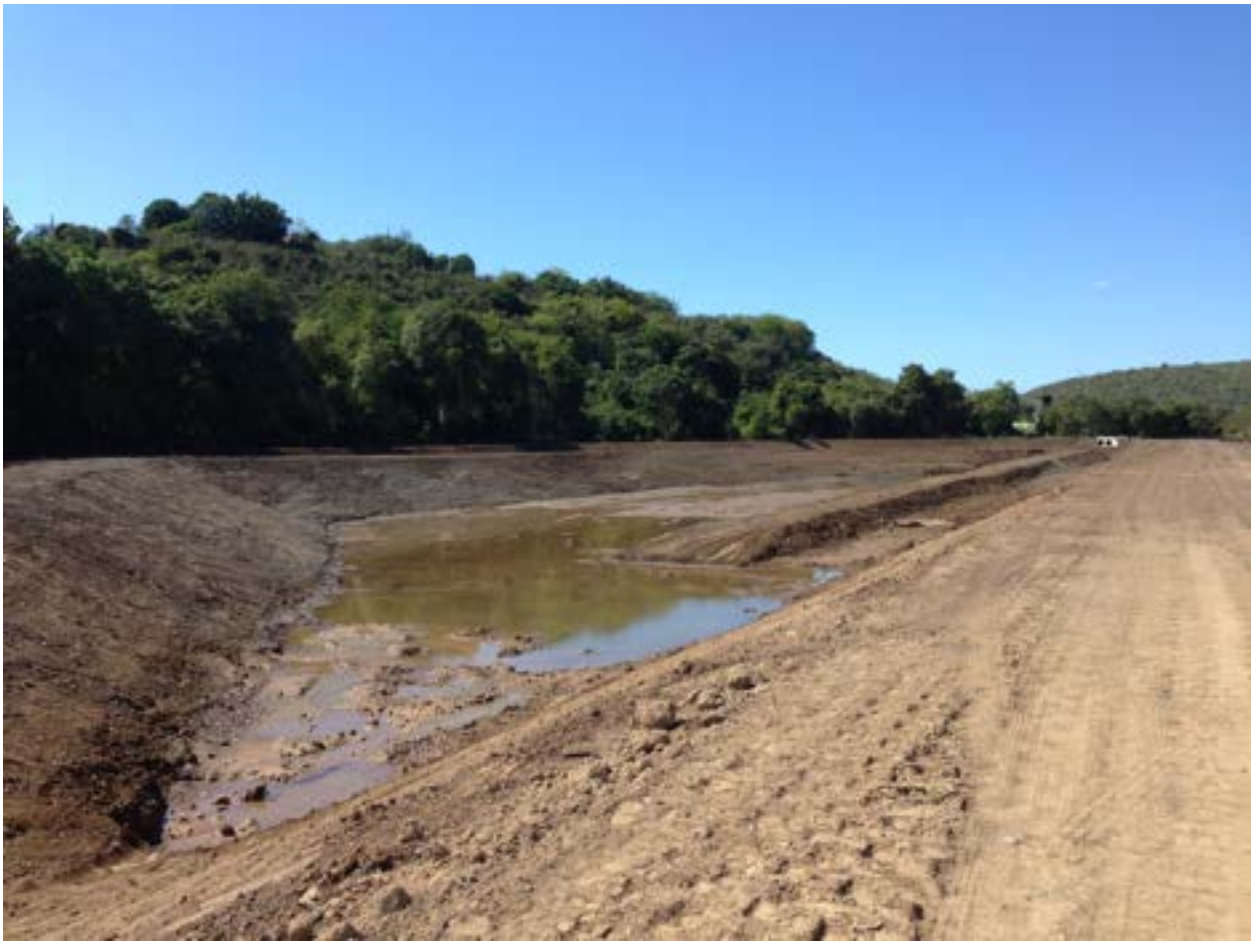

Figure 2. Sediment pond prior to stabilization efforts

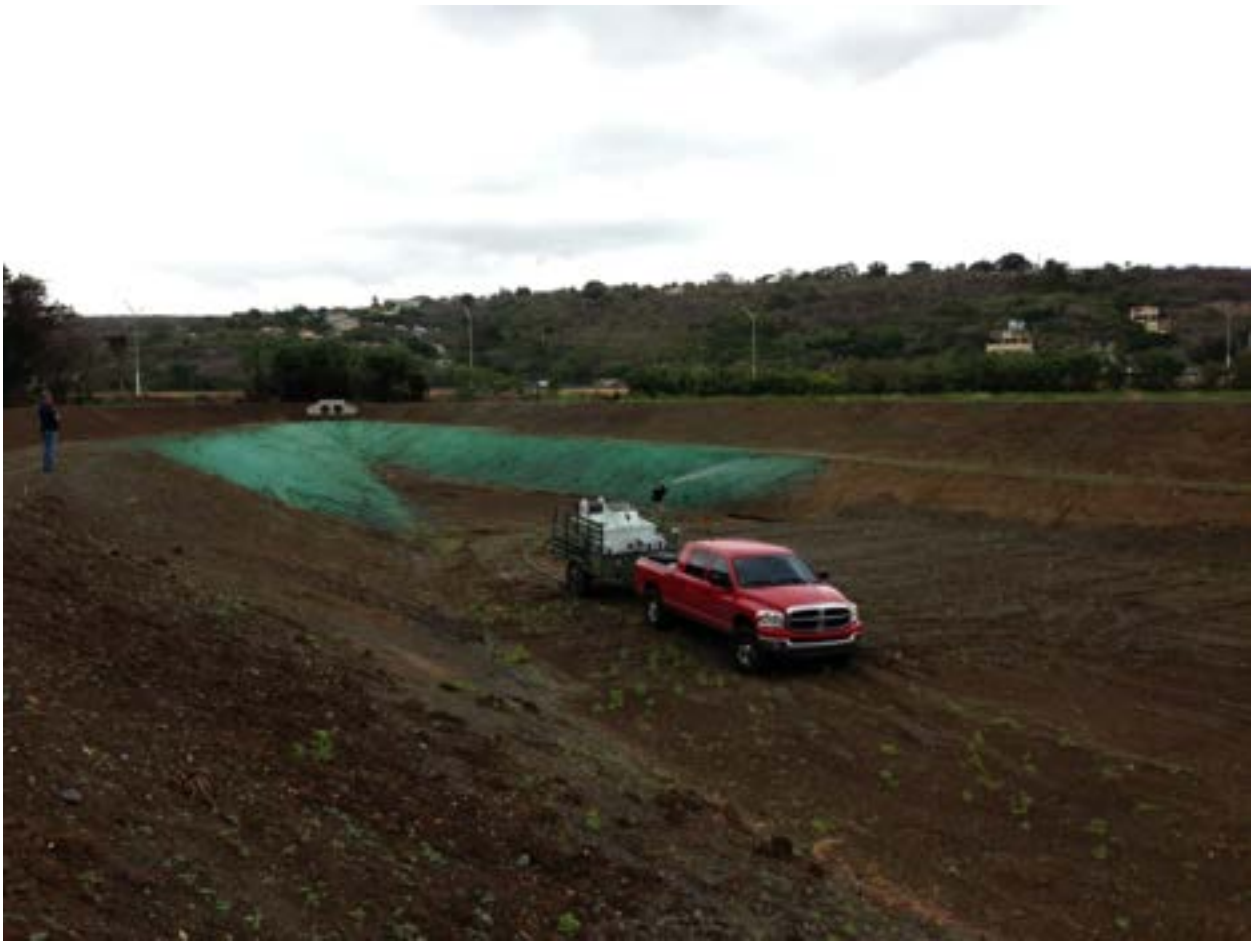

Figure 3. Hydromulch application in the sediment basin working with the Southwest Soil Conservation District and NRCS

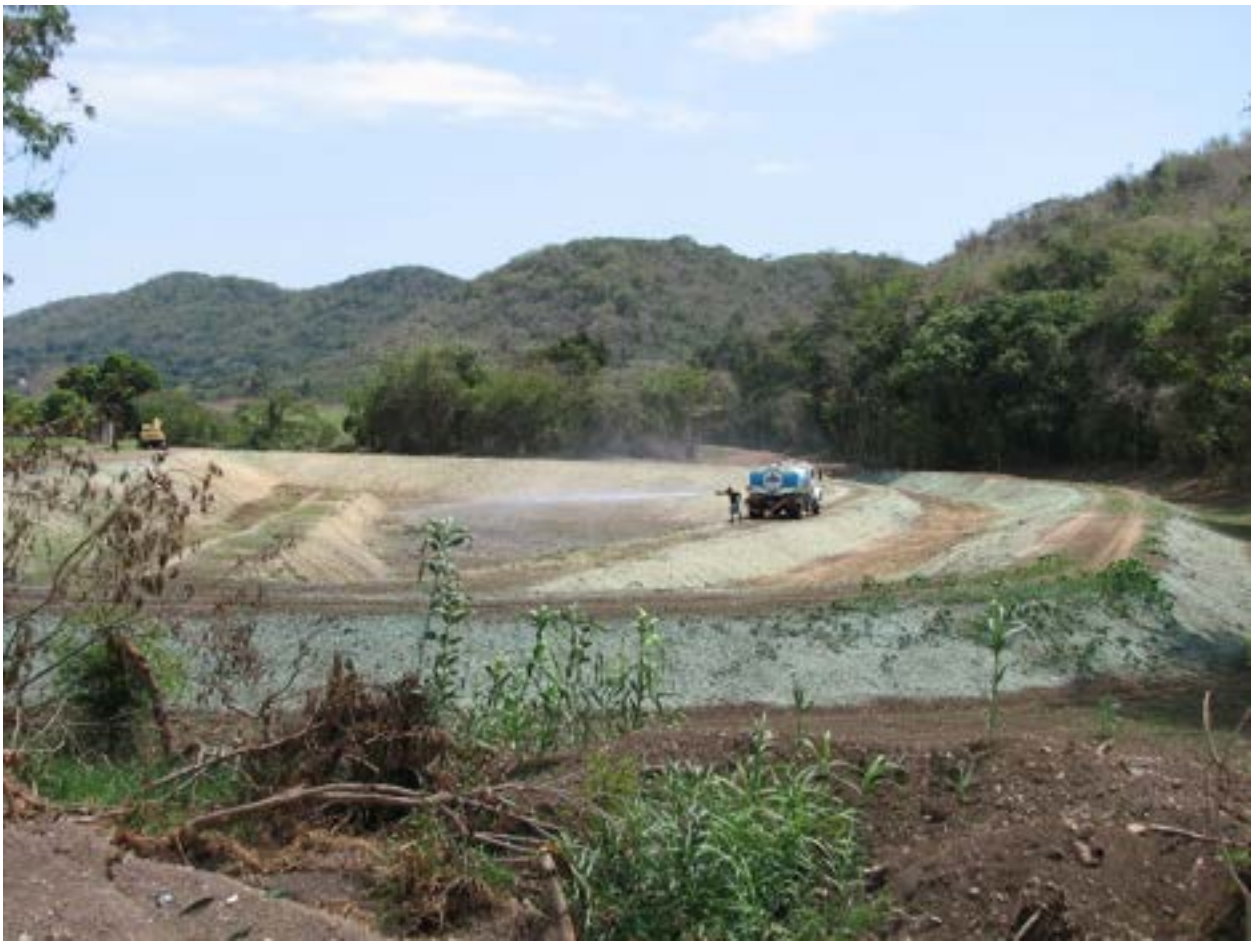

Figure 4. Watering the sediment pond project site using assistance from Department of Natural and Environmental Resources

Hardware store

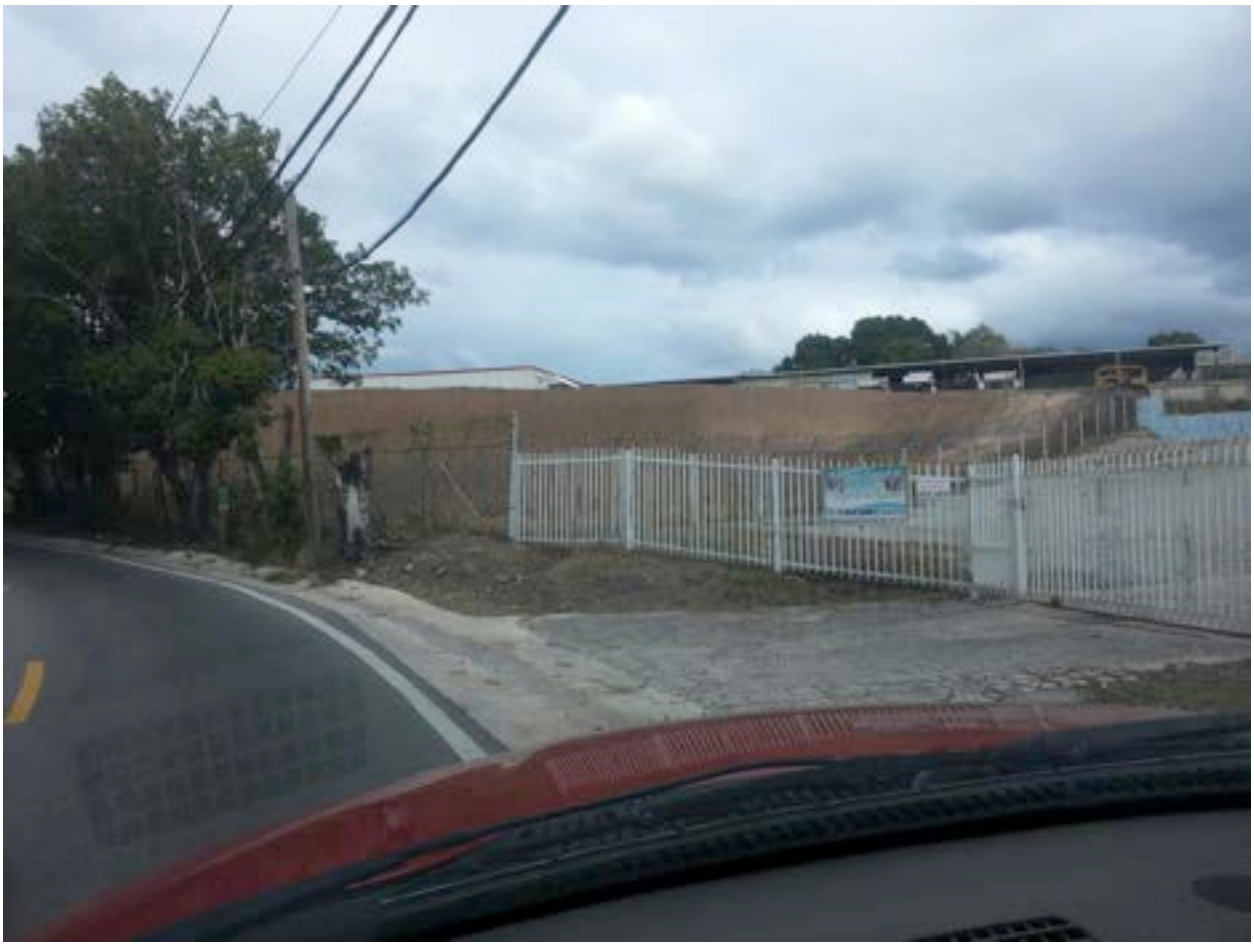

Figure 5. Bare soil from the hardware site

Figure 6. Preparing the site for hydroseeding

Figure 7. Hydroseeding in process at the hardware store site

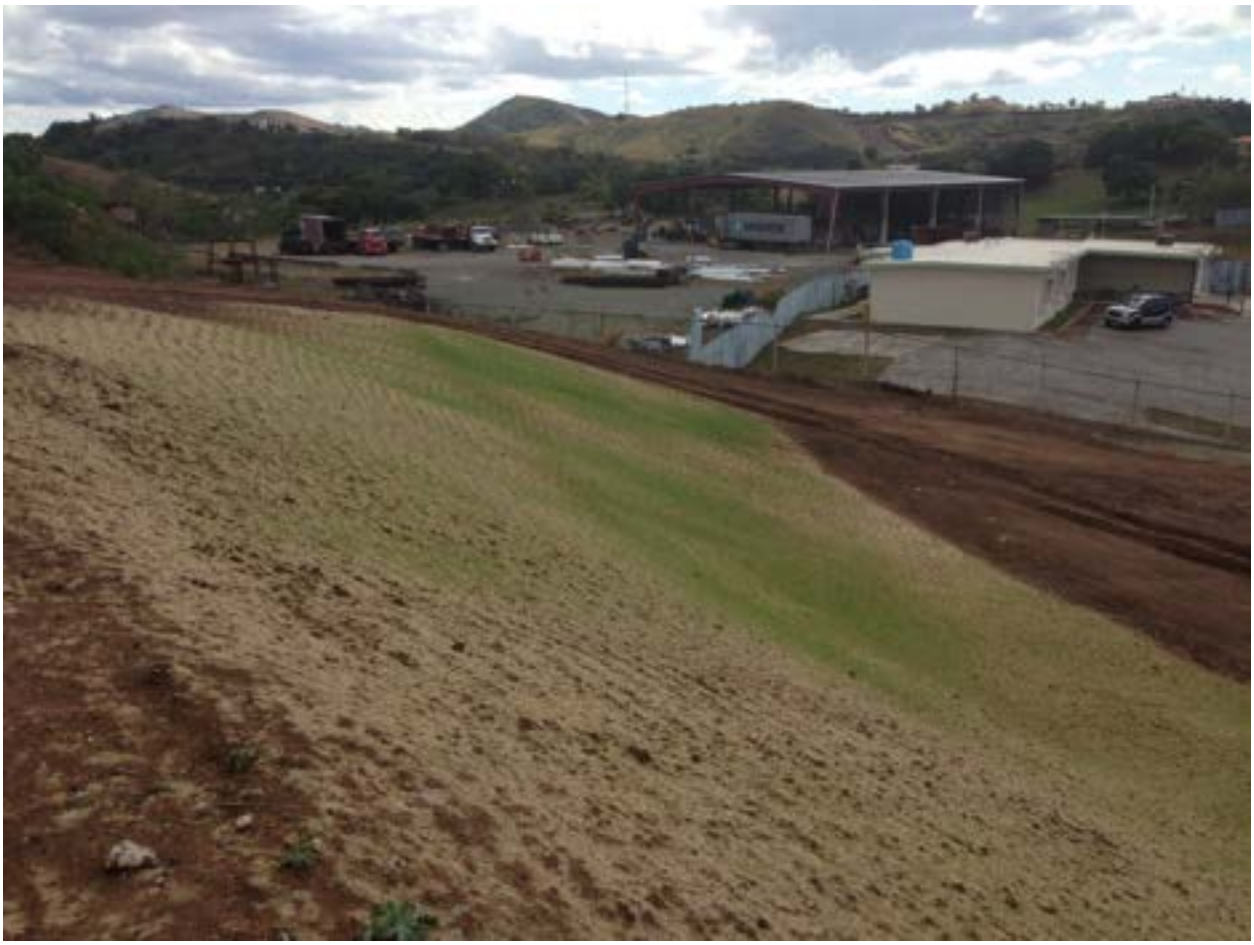

Figure 8. Stabilization and initiation of germination of hardware site

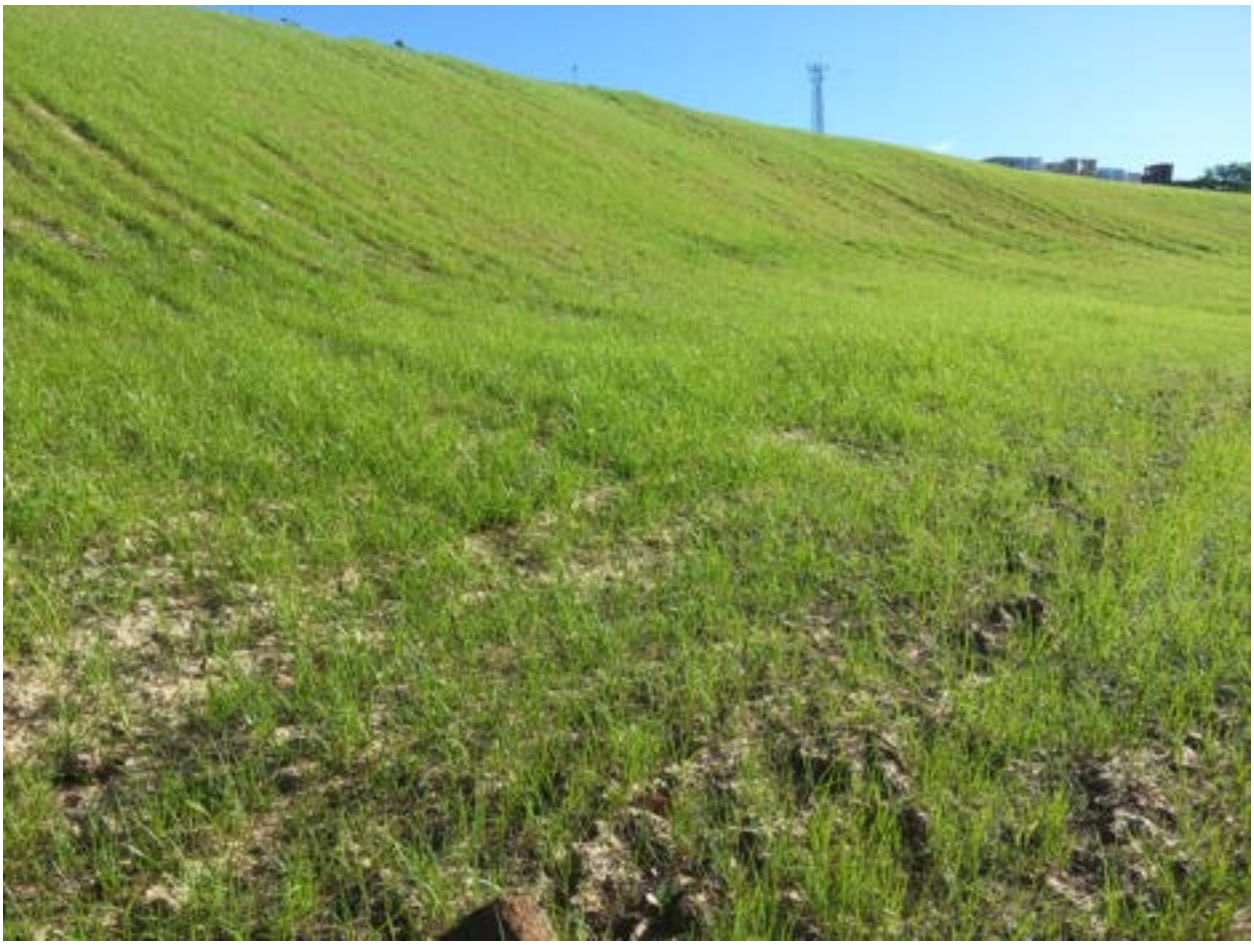

Figure 9. Re-establishment of grass at the site

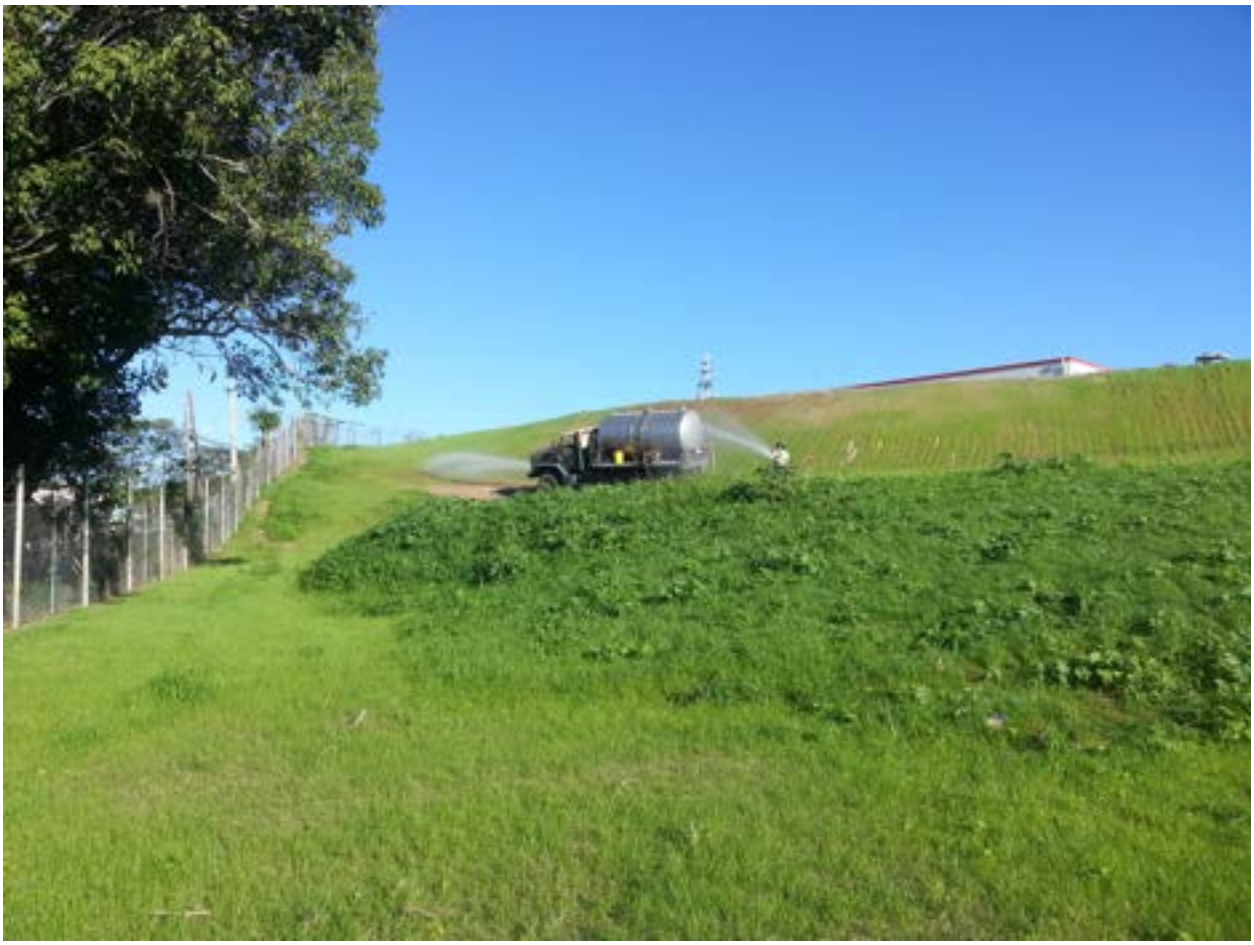

Figure 10. Vegetative stabilization and watering at the hardware store site

Finca La Paz

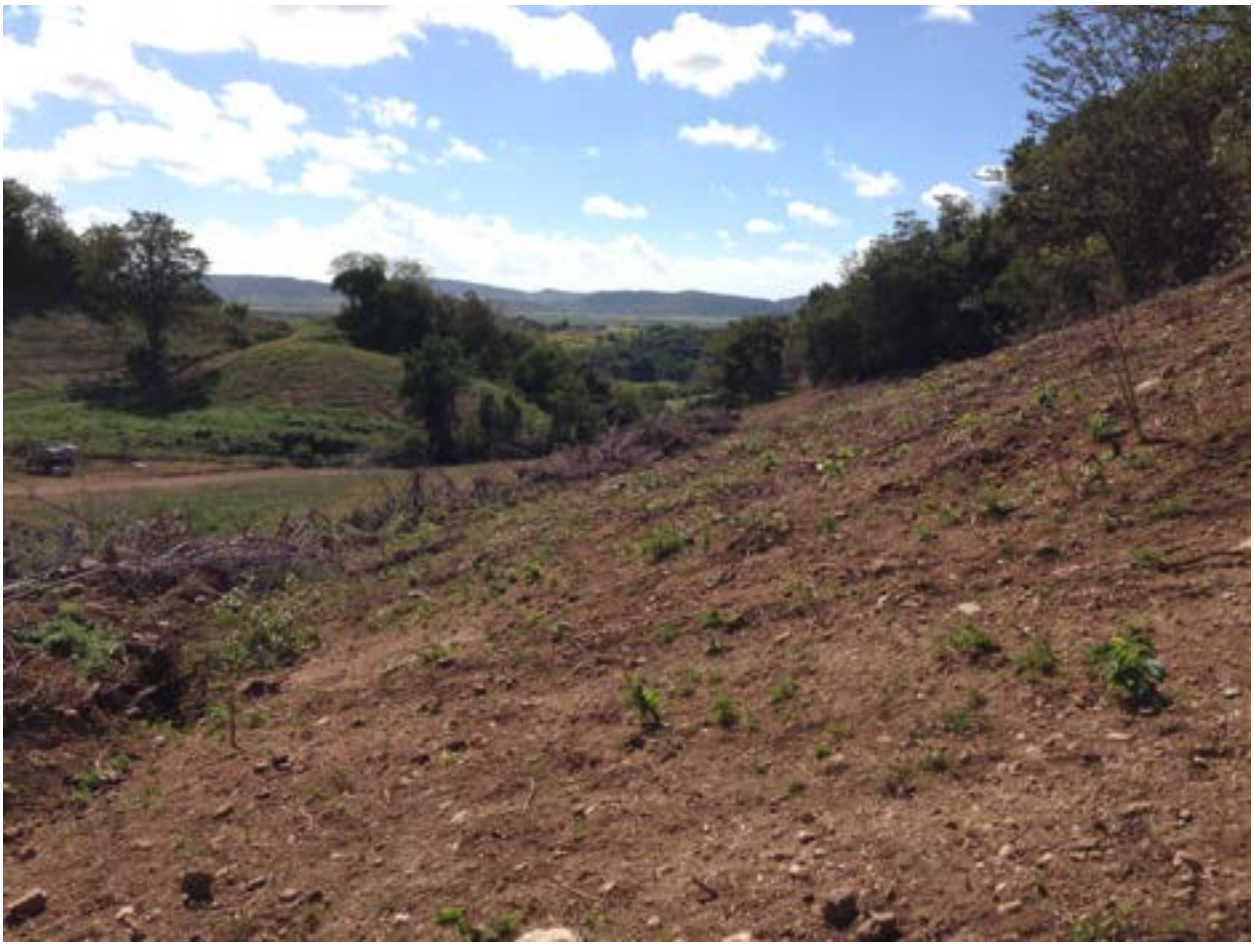

Figure 11. Bare soil cleared on Finca La Paz -- note piling of woody debris to break the slope and reduce concentrated runoff from the hillslope

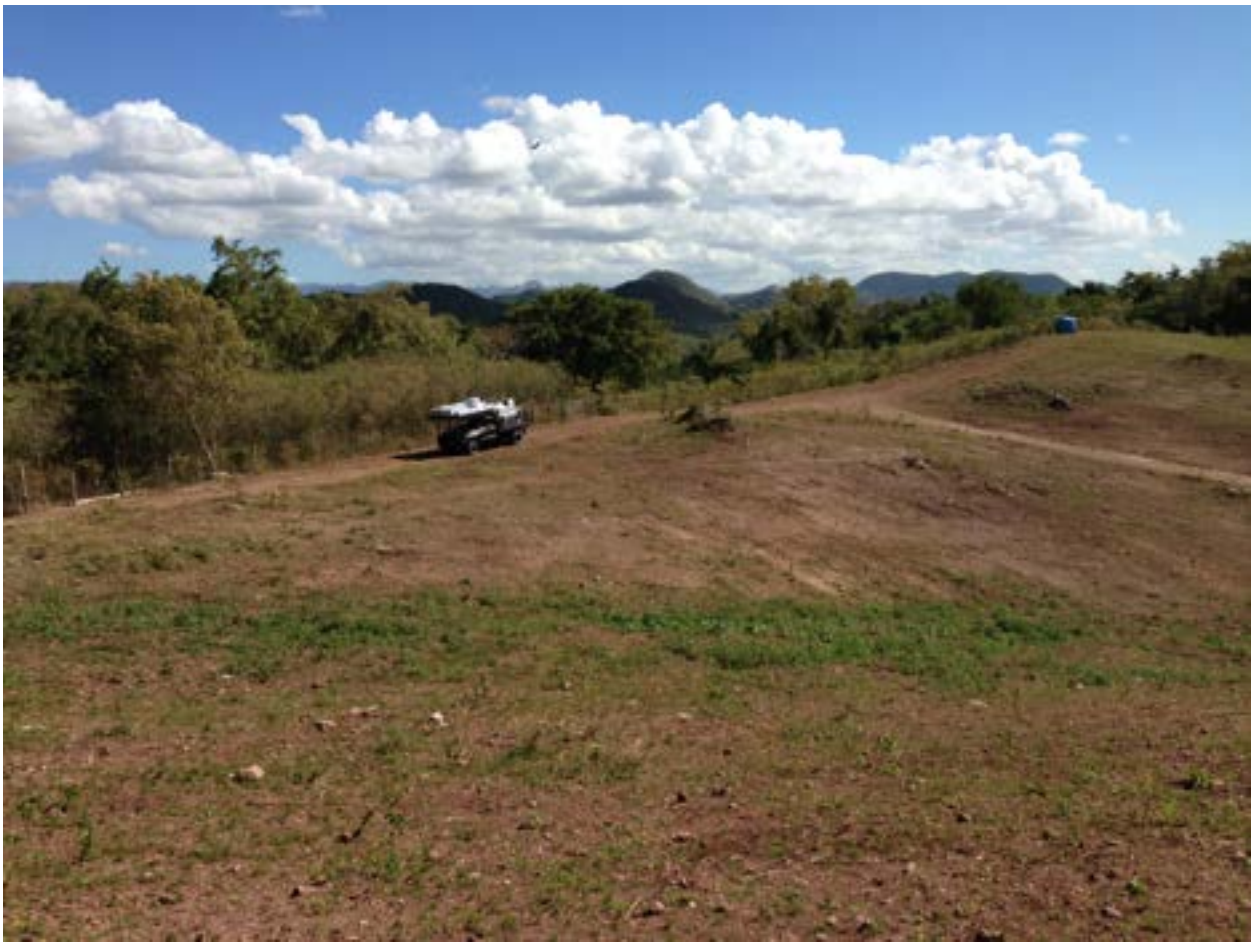

Figure 12. Part of the La Paz site prior to stabilization

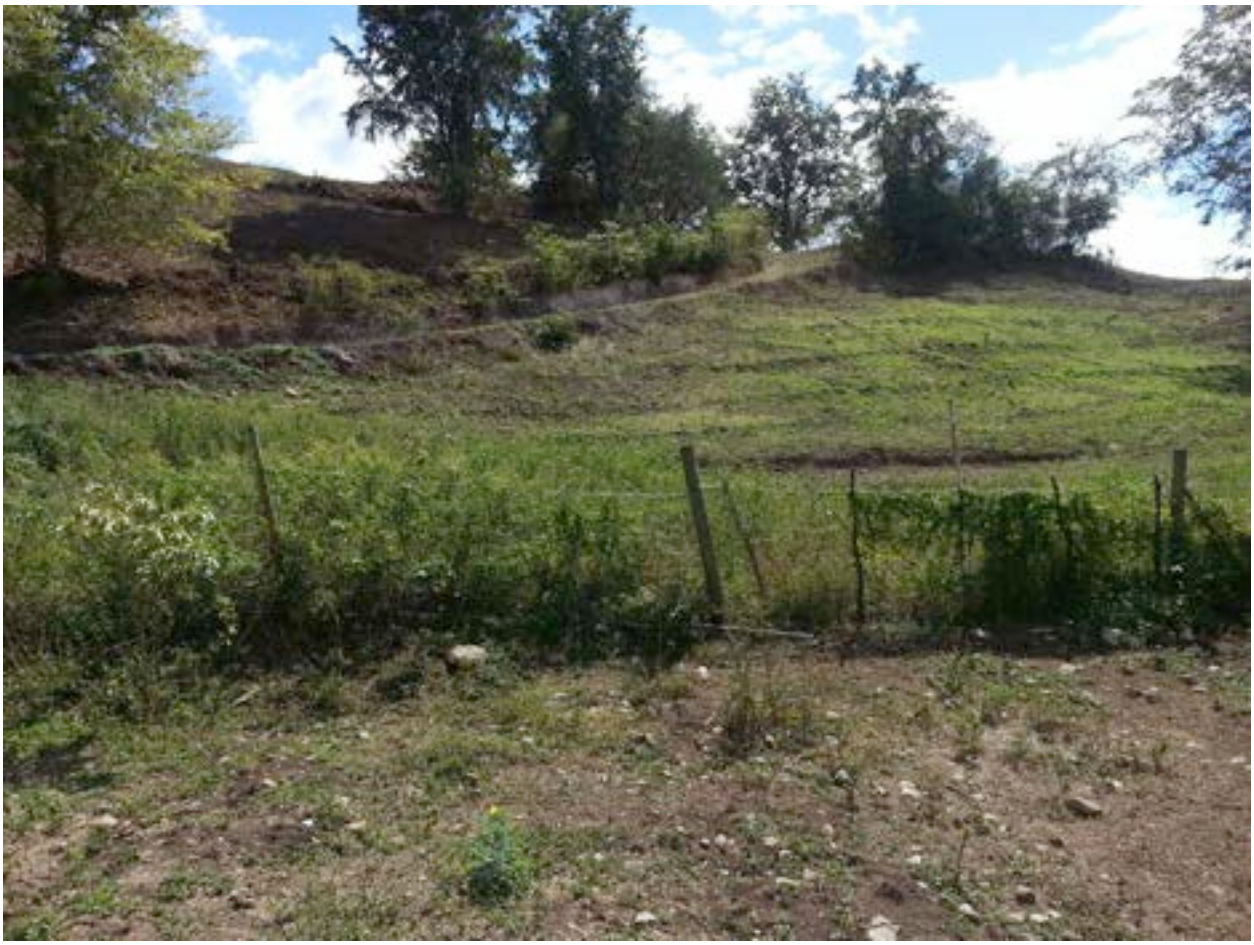

Figure 13. Germination of the La Paz site

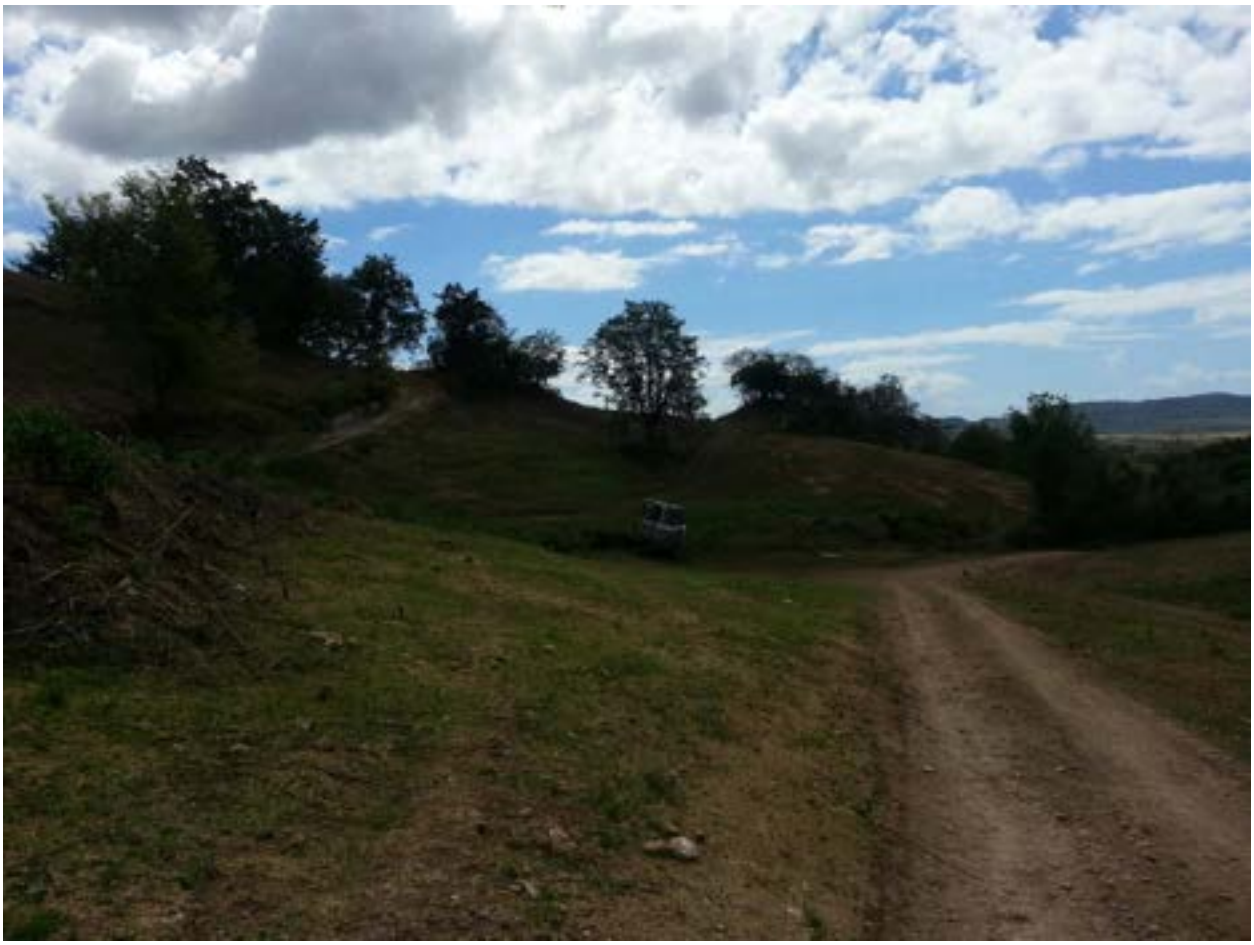

Figure 14. Germination and greening of the La Paz site

Figure 15. Stabilization at the Finca La Paz site

Training and Capacity Building

- NRCS staff, SW Soil Conservation District, NOAA staff, Municipality of Yauco, Municipality of Guanica, local businesses, farmers and Puerto Rico Department of Natural and Environmental Resources (DNER) all participated in the projects and played direct roles in the project
- Protectores de Cuencas was able to train a 3 person labor crew that is knowledgeable and can work as a team with supervision and guidance to perform hydromulching activities
- Several construction projects have requested quotes and we have performed hydroseeding for the Municipality of Yauco and for one development project
- Farms have begun requesting and inquiring about our services

Obstacles

- there is little to no local, Federal or Commonwealth enforcement of erosion and sediment control (ESC) regulations in Puerto Rico -- so as a result there is little to compel developers or land clearing operations to spend the resources necessary for rapid stabilization and proper ESC
- regulations require rapid stabilization often within 15 days of final clearing but this is never enforced in Puerto Rico
- Hydroseeding and successful stabilization through follow up watering is quite expensive compared to the alternative -- allowing silt fence to blow in the wind or to do nothing at all
- On the positive side hydroseeding is quite cost competitive with sod as a stabilization method
- Hydroseeding in mountainous and high evaporation areas of Puerto Rico is more expensive than similar applications stateside -- so NRCS cost-share rates are not adequate to make hydroseeding viable in Puerto Rico as a fully funded or well funded cost-share practice despite its effectiveness at controlling erosion
- Puerto Rico Environmental Quality Board (EQB) and USEPA need to be further brought into these projects to be made aware of the advancements in hydroseeding being made in Puerto Rico and to begin to advise developers and agencies in the use of this methodology
- The benefits to developers in terms of decreased costs of regrading after storm events, extensions in project time and overall project costs need to be described for PR and the Caribbean in order for developers to see project benefits and not just compliance benefits to hydroseeding